temperature was slightly, but irregularly, elevated, and the leukocytes, which had been below 5000, rose to 12,000. A tuberculin test was made; there was no reaction to 0.5 milligram given subcutaneously, but 2 milligrams caused a well-marked reaction. Later, there was marked reaction to the ophthalmotuberculin test. His general condition improved, although the peritoneal exudate persisted. He left the hospital January 21, 1908, in good condition, but with a considerable quantity of fluid still in the abdominal cavity.

In at least four of these six cases the effusion, so far as can be determined, was due to pathological conditions resulting from typhoid infection. The immediate cause of the effusion is uncertain. The disease was severe and attended by much prostration. The abdomen was very relaxed and the contents therefore had little support, so that the vessels would easily dilate, permitting considerable stasis, or at least marked slowing of the current of blood, thus favoring serous exudation. It is possible, also, that the mesenteric glands were greatly enlarged, causing slight but sufficient irritation of the peritoneum to excite effusion.

Toxemia is another possible cause of the effusion. In hepatic cirrhosis something more than simple obstruction to the portal vessels is required to cause ascites. This may be a toxic substance which affects the hepatic cells so as further to obstruct the portal circulation, or alters the peritoneal epithelium so as to permit a more rapid escape of serous exudate and possibly also cause obstruction of the peritoneal lymphatic vessels, so that the exudate is less readily removed.

It is probable that in other diseases attended by prostration moderate effusion into the serous cavities may be more frequent than is suspected. Recently in a case of empyema with a bronchial fistula, there were signs of peritoneal effusion for some days during a period of marked prostration and moderate toxemia; they disappeared with the improvement in the general condition. Even in hepatic disease ascites may disappear rapidly, and that, too, without improvement in the patient's general condition. Such was the case in a woman who entered the hospital last winter with marked jaundice and ascites of recent onset. After a few days both the jaundice and ascites rapidly diminished and disappeared, although her general condition was growing worse. She gradually became comatose and died a few days later.

LOBAR PNEUMONIA.

A STUDY OF 445 CASES, WITH SPECIAL REFERENCE TO THE DECREASED MORTALITY SINCE THE INSTITUTION OF THE FRESH-AIR TREATMENT.

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The following study is based on a consideration of 445 cases of croupous pneumonia admitted to the Philadelphia General Hospital between February 1, 1905, and December 23, 1907. The data were collected from the clinical histories, in a considerable number of which the facts had been verified by postmortem examination. All cases, which, by the latter method, proved to be instances of miliary tuberculosis, hypostatic pneumonia, etc., were excluded from this compilation. February 1, 1905, was chosen for the beginning of the present study, since this time marks the beginning of the fresh-air treatment, the pneumonia patients being isolated in a special ward in which the windows are constantly kept wide open regardless of weather or temperature. The statistics of males and females have been kept separately for the special reason that women with pneumonia, owing to lack of room and the relative fewness of their number, are still treated in the general medical wards in which only the ordinary hospital ventilation is employed, the windows being generally closed during the cold months of the year when most of the cases occur. Some years ago, before the institution of the fresh-air regime, a similar study of the pneumonia cases in the same hospital was made by Ashton and Landis,[1] based on a study of 991 cases. Since there has been no change in the character of the patients coming under observation or in the methods of treatment employed, except the constant and liberal supply of fresh air, it is interesting to compare the result of the two series of cases.

As was pointed out by Ashton and Landis, in considering pneumonia as it is seen at the Philadelphia General Hospital, we are not confronted with average, but with extreme and somewhat unusual types of this disease. The patients with whom we have to deal are, in the vast majority of instances, far advanced in years—inmates of the almshouse—who have come to await death within its portals. Nearly all of them are the subjects of advanced states of degeneration of their various viscera, among which high-grade arteriosclerosis and chronic nephritis are not the exception, but the rule. The foregoing statements apply with equal truth to the large number of patients afflicted with insanity or chronic nerve disease who contribute to our large mortality. The second class of cases with whom we have to deal are, from a therapeutic standpoint, no less discouraging, namely, the large number of tramps and habitual drunkards who have reached the lowest depths of depravity and vice, who often wind up a prolonged debauch with an attack of pneumonia and are brought to the hospital with delirium tremens or in a moribund condition.

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[1] Amer. Jour. Med. Sci., June, 1905.

I was led to collect the present series of statistics by the fact that a considerable number of what appeared clinically to be hopeless cases recovered, and I wished to verify my impression. The mortality in Ashton and Landis' series was over 53 per cent. The general mortality in the present collection was 47 per cent., not a great difference it would seem at first sight; but when we eliminate the female cases we find that 170 among 383 males died, giving a mortality of 43.6 per cent., or 10 per cent. less than before the fresh-air treatment was adopted. If from this number we subtract those that died within twenty-four hours of admission—moribund when admitted—we get a mortality of 38 per cent. This, of course, is still considerably above the average of 25 per cent., which obtains throughout most of the hospitals the world over, but when we consider the class of cases with which we have to deal it is not so bad. Of the women on the other hand, of whom there were but 62 in the present series, 40 died—a death rate of 64.5 per cent.; excluding those who died within twenty-four hours of admission—2 in all—we still are confronted with a mortality of 61.3 per cent. This is extremely high even allowing for the fact that the mortality among women is generally greater than in men. This may be construed as evidence detracting from the beneficial effects of the fresh-air treatment, since in Ashton and Landis' series the male and female statistics were not separated, and their high mortality may have been largely the result of female deaths, the number of which was not stated. I am, however, of the belief that the decrease in mortality more than counterbalances the influence of the female deaths in the first series, a fact which is apparently substantiated when the total death-rate of the two series is compared (53 per cent. against 47 per cent.). Another element which tended to prevent a still greater reduction in mortality was the fact that a number of the male patients did not receive the fresh-air treatment during their whole stay in the hospital, since it is not the custom to transfer cases to the pneumonia ward until a positive diagnosis has been reached.

Aside from the constantly open windows and door there has been no innovation in the method of treatment employed. For the most part therapeusis has been symptomatic in character, mainly sedative or stimulating as the individual case seemed to demand. In other words, active delirium and insomnia were treated with bromides, opium, etc., asthenic cases with strychnine, caffeine, ammonia, digitalis, etc. It seems to me that in the average case perhaps too much stimulation has been employed. Owing to the erroneous conception of the pathology and therapeusis of pneumonia with which the average resident physician enters the hospital, it seems to be his almost invariable custom to prescribe strychnine from the beginning, to "keep up the strength" despite the fact that the patient's condition may be quite satisfactory without any stimulation whatever. The use of alcohol seems to be steadily falling more and more into disfavor, and justly so, since this drug does more to relax the vasomotors than to stimulate the heart; and it has been quite definitely shown by the experimental researches of Paessler and Rolly that the vasomotor system is the one which causes death in pneumococcic infection, and not the heart. It is not my purpose to take up the apparently endless question as to whether alcohol is or is not a food, but it does seem to me to have been shown by Bachman that alcohol possesses no power of sustaining action in an isolated rabbit's heart, such as does, for instance, grape sugar. On the other hand, it seems to be a fact based on prolonged clinical observation that habitual topers, when attacked by pneumonia, are often benefited by reasonable amounts of this drug. Hay, who collected statistics of 150 pneumonia patients, found the mortality 15 per cent. lower among those who did not receive alcohol.[2] Eserine has been employed beneficially in a number of cases in which there was marked tympanites, an extremely serious symptom which generally bespeaks a high grade of toxemia, and exerts a very deleterious action on the circulation, respiration, and digestion.

Sponging with cold water has been used quite frequently and with good results, not so much for the purpose of reducing the temperature, which it does very satisfactorily, but more with a view to toning up the vasomotor system, for which purpose it seems to be our most useful remedy.

Digitalis is still used to an astonishingly large extent when one considers the impotency of this drug in febrile cases, a fact which has been repeatedly pointed out by careful observers, but which does not seem to be generally recognized. Personally, I have never been convinced that digitalis accomplished anything in cases having any considerable degree of fever. The inaction of digitalis in pneumonia was, I believe, first pointed out by Thomas,[3] in 1865. Inasmuch as digitalis acts on the heart chiefly through the vagus, it would seem that its failure in effect might result from paralysis of this nerve, since it has been shown by Schleske and Cyon that high temperatures in frogs do bring about such a paralysis; furthermore, Liebermeister's experiments in mammals indicated a similar state of affairs. Brunton,[4] however, who has especially studied this point, found that "in the rabbit and probably other mammalian hearts, a temperature sufficiently high to produce stoppage of the heart, does not paralyze the vagus or the inhibitory apparatus through which it acts;" although "it is possible that a longer exposure to a high temperature, such as occurs in fevers, may produce this result."

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[2] Lancet, 1904, 1, 1643.

[3] Arch. f. Heilk., 1865, p. 329.

[4] Circulation and Respiration, 1906.

COMPLICATIONS. Among 445 cases (males and females being included) *acute pericarditis* was encountered 8 times, all of the cases being fatal. This incidence of pericarditis in 1.7 per cent. of the cases corresponds very closely to the general literature on the subject from which the following statistics were collected:

	Pneumonia.	Pericarditis.
A. H. Smith	485	6
M. Huss	2616	22
Townsend and Coolidge	1000	3
Leudet	83	6
Ormerod	268	33
Flint	133	8
Behier	114	3
Dusch	369	3
Sturgis and Coupland	161	3
Collective Invest Rep.	1056	2
Bisch	11,442	62
Sturges	16	6
Fismer	460	13
Spence	201	7
Hadden, McKenzie, and Ord	708	19
Schleinger	173	4
Musser	489	6
Norris	500	4
Ashton and Landis	991	1
McCrae, Fyshe, and Ainley	486	16
Pye-Smith	434	14
Sello	750	7
Sears and Larrabee	949	19
Meyer	500	5
Juergensen	5738	27
Grisolle	58	3
Chatard	665	31
Poehlmann	239	5
Hay	200	9
Anders	275	14
Austin	70	3
Petzold	271	4
Kaller and Lefebvre	100	1
Rychner	616	17
Doubleday	254	6
Meltzer	4252	46
Bisch	4231	20
West	100	3
Satterthwaite	55	5
Audeoud	419	5
Jackson	1320	22
Geo. W. Norris	445	8
Total	43,722	501 (1.1%)

Acute endocarditis occurred 3 times. All of the cases terminated fatally. The collected literature on this subject is as follows:

	Pneumonia.	Endocarditis.
Aufrecht	1501	1
Fismer	230	2
Wells	6050	19
Liebermeister	204	1
Sello	750	6
McCrae, Fyshe, and Ainley	486	14
Musser	489	1
Becker	415	1
Meyer	500	5
Norris	500	5
Rychner	616	8
Pye-Smith	434	7
Juergensen	5738	11
Dusch	369	4
Petzold	271	1
Hadden, McKenzie, and Ord	708	1
Collect. Invest Rep.	1065	1
Austin	70	1
Hall	70	1
Huss	2616	4
Baeck	340	1
Biach	6885	15
Croce	610	6
West	100	0
Sears and Larrabee	291	9
Chatard	658	13
Omerod	183	6
Audeoud	419	4
J. M. Clarke	126	1
Geo. W. Norris	445	3
Total	33,139	153 (0.46%)

Empyema occurred only twice in the present series. One case ended fatally, the other recovered. My collected statistics show the following incidence:

	Pneumonia.	Empyema.
Chatard	658	27
Middlesex Hospital	267	9
Coll. Invest. Rep.	1065	5
Spence	201	4
Gaitskell	10	1
Townsend and Coolidge	1000	6
Hadden, MacKenzie, and Ord	708	6
Musser	489	9
Norris	500	6
Ashton and Landis	991	3
Aufrecht	1501	24
Meyer	500	12
Sello	750	34
Sears and Larrabee	949	19
White and Pearce	1341	45
Pye-Smith	434	24
Futcher	48	1
Hall	70	5
Poehlmann	239	7
A. H. Smith	488	10
Kaler and Lefebvre	100	1
Schlesinger	173	7 children
McCrae, Fyshe, and Ainley	486	18
Doubleday	252	15
Fismer	230	4
West	100	1
Audeoud	419	22
Jackson	1320	22
Morse	118	9 children
Geo. W. Norris	445	2
Total	15,852	258 (2.2%)

Pulmonary abscess was encountered in two instances, one of them ending in death. My collected statistics are as follows:

	Pneumonia.	Pulmonary abscess.	
Huss	2616	20	12 fatal
Sturges and Coupland	267	1	
Grisolle	280	1	
Bamberger	186	1	
Morehead	189	5	
Spence	201	1	1 fatal
Flint	133	4	2 fatal
Aufrecht	1501	3	
Musser	489	2	2 fatal
Steven	120	2	2 fatal
Sello	750	11	
Lebert	898	4	
Sears and Larrabee	949	3	
Baeck	340	1	
A. H. Smith	304	1	1 recovered
Norris	500	0	
Poehlmann	239	1	1 fatal
Rychner	616	0	
St. Barts Hospital	1165	2	
Doubleday	252	1	
West	100	1	
Satterthwaite	55	0	
Elsner	150	11	
Fismer	230	0	
Audeoud	419	1	
Jackson	1320	1	
Geo. W. Norris	445	2	1 fatal
Total	14,214	83	(0.5%)

No cases of *pulmonary gangrene* were recorded.

Meningitis was noted in 3 instances, with 2 deaths. In addition to these cases, there were 2 which presented marked symptoms indicating meningeal irritation, such as headache, vomiting, cervical rigidity or retraction, and delirium, but in which no actual palsies or occular neuritis occurred. Both of these cases recovered. They were, therefore, classified as "meningismus," probably the result of toxemia. A diagnosis between the two foregoing conditions is often difficult, but, as a rule, may be settled by lumbar puncture. The collected statistics added to the present series give the following table:

	Pneumonia.	Meningitis.	Died.
Huss	2616	2	2
Dusch	630	7	
Coll. Ivnest. Rep.	1065	1	
Biach	11,422	15	15
Chomel	50	5	
Townsend and Coolidge	1000	1	1
Norris	500	4	1
Becker	505	1	1
Flint	133	1	1
Musser	489	1	
McCrae, Fyshe and Ainley	486	23	
Sears and Larrabee	949	7	
Meyer	500	5	
Chatard	658	13	13
Aufrecht	1501	4	
Nauwerk	1172	14	
Sello	750	5	
Juergenson	5738	8	
Fismer	230	6	
Fraenkel	750	5	
Firket	16,333	64	
Poehlmann	239	1	1
Rychner	616	7	
Mueller	444	2	
Doubleday	252	4	4
Audeoud	419	12	12
Jackson	1320	3	
Geo. W. Norris	445	3	2
Total	51,212	234 (0.4%)	53 (Mortality 93%)

Acute arthritis as a complication occurred 3 times, twice ending in death. This is one of the rarer complications, which we find with increasing frequency in the later statistical study of pneumonia, for the reason that the joint involvement has in the past been attributed to an intercurrent rheumatism. It is, however, a true complication due to the local action of the pneumococcus. The condition has been so carefully studied and described by Cave, Herrick, and others, that a further consideration is at present unnecessary. In the literature the following cases have been reported:

	Pneumonia.	Arthritis.	Died.
Huss	2616	22	2
Coll. Invest. Rep.	989	8	
Grisolle	201	4	
Fox	53	1	
Spence	201	1	
Townsend and Coolidge	1000	8	1
Hadden, MacKenzie, and Ord	708	40	13
Musser	489	5	1
A. H. Smith	488	0	
Sello	750	1	
Ashton and Landis	991	2	0
Norris	500	1	1
Cave	2202	2	
Sears and Larrabee	949	23	7
Netter	4156	6	
Ziemssen	3293	2	
Fismer	230	1	
Raw	817	7	3
Petzold	271	3	
Hall	70	1	
Riessell	445	2	
Rychner	616	0	
Vogelius	5158	6	
Hermann	235	1	
Poehlmann	239	0	
Sainter	331	0	
Audeoud	419	3	2
Croce	610	1	
Jackson	1320	1	
Clarke	126	1	
Geo. W. Norris	445	3	2
Total	30,113	158	32
		(0.5%)	(Mortality 28%)

Otitis media occurred in 6 cases, 1 of which ended fatally. This is one of the complications which occurs more frequently in children than in adults, a fact which accounts for the paucity of these cases in the present series. It not infrequently produces symptoms which simulate meningitis, even when no actual meningeal involvement has occurred. A careful aural examination, in cases of penumonia presenting atypical symptoms, is too frequently neglected. The collected statistics are as follows:

	Pneumonia.	Otitis.	Died.
Dusch (children)	173	18	
Gross	314	2	
Coll. Invest. Rep.	1065	2	
Norris	500	2	0
Becker	505	1	
McCrae, Fyshe, and Ainley	486	19	
Sears and Larrabee	949	16	
Pye Smith	434	3	
Hall	70	1	
Futcher	48	1	
Morse (infants)	118	21	
Musser	489	4	2
Doubleday	252	2	0
A. H. Smith	488	6	0
Schlesinger (children)	173	18	
Geo. W. Norris	445	6	1
Total	6508	122	3
		(1.8%)	(Mortality 1.5%)

Parotitis, another of the less common complications was recorded once, and this case terminated favorably. The infection of the gland in these cases may be either hematogenous or by way of Steno's duct. Comparing our incidence percentage with the general literature, we find:

	Pneumonia.	Parotitis.	Died.
Sturgis and Coupland	123	1	
Mueller	444	1	
Norris	500	1	0
McCrae, Fyshe, and Ainley	486	4	
Sears and Larrabee	949	2	1
Musser	489	1	0
Flint	131	1	1
Geo. W. Norris	445	1	0
Total	3575	12 (0.3%)	2 (Mortality 16%)

Acute peritonitis occurred only once in the present series, and ended in death. A good deal has been written on the subject of pneumococcic peritonits lately, since primary peritonitis due to this cause is of no great rarity. Inasmuch as infection may take place through the genito-urinary tract, the condition is more common in females. Hematogenous and gastro-intestinal infection, according to Sulzer, also occur. In a good many of the cases there is a tendency for the inflammatory process to become encysted, and unless evacuated by incision, to rupture into the umbilicus, intestines, bladder, scrotum, etc. In cases secondary to pneumonia such events so far as I know have not been reported. Peritonitis complicating pneumonia has been reported as follows:

	Pneumonia.	Peritonitis.	
Fawcett	182	5	
Mueller	441	1	
Townsend and Coolidge	1000	2	1 fatal
Musser	489	1	1 "
Sears and Larrabee	949	3	3 "
Norris	500	1	1 "
Poehlmann	239	1	1 "
Rychner	616	4	
A. H. Smith	428	0	
McCrae, Fyshe, and Ainley	486	3	
Hadden, McKenzie, and Ord	708	0	
Doubleday	252	3	3 fatal
Chatard	658	3	
Sello	750	1	
Pye-Smith	434	0	
Audeoud	419	0	
Clarke	126	2	
Geo. W. Norris	445	1	1 fatal
Total	9221	31 (0.3%)	11 (Mortality 92%)

Acute colitis occurred in 4 cases; none of these recovered. *Phlebitis* was encountered once, the femoral left vein being involved, with eventual recovery. The *urine* was examined for albumin in 397 cases; it was found in 311 (78 per cent.); 136 of these died (34 per cent.). Albumin was absent in 86 cases, of which 27 died (31 per cent.). There were records of 382 microscopic examinations. Casts were found in 236 cases, of which 106 died (27 per cent.). They were absent in 130 cases, of which 63 died (49 per cent.). Aside from these examinations a clinical diagnosis of acute nephritis was recorded 16 times, in 14 of which a fatal termination occurred (87 per cent.). It will be seen, therefore, that acute nephritis is one of the most serious complications of pneumonia. In the general literature the condition has been reported as follows:

	Pneumonia.	Acute nephritis.	Died.
Juergensen	5738	66	
Huss	2616	52	
Fismer	220	1	
Zurich	500	13	
Meyer	500	3	
Norris	500	3	
Becker	505	2	
Nauwerk	550	14	2
Musser	489	6	4
Sello	750	6	
Aufrecht	1501	16	
Rosenstein	130	2	
Wagner	150	4	
Fraenkel and Reiche	956	6	4
Ashton and Landis	991	5	3
Mayer	44	2	
Petzold	271	7	
Hadden, McKenzie, and Ord	708	3	1
Townsend and Coolidge	1000	9	4
Dusch	369	3	
Sturgis and Coupland	91	14	
Spence	201	8	4
Flint	133	2	
Audeoud	419	6	6
Clarke	126	1	
Poehlmann	157	1	
Morhart	139	2	
Baeck	340	6	
Geo. W. Norris	445	16	14
Total	20,107	263 (0.5%)	42 (Mortality 57%)

The following list shows the diseases in which pneumonia appeared as an intercurrent infection, frequently a terminal one. The gravity of the affections is such as to require no comment on the high mortality which resulted:

	Total.	Died.	Mortality. Per cent.
Chronic nephritis	45	41	93
Delirium tremens	24	18	64
Arteriosclerosis[4]	36	36	100
Myocarditis.	22	21	95
Alcoholism[5] (in addition to the above)	62	37	59
Uremia	5	5	100
Chronic endocarditis	5	5	100
Mitral	10	8	80
Aortic	4	2	50
Erysipelas	7	6	85
Pulmonary tuberculosis	16	9	56
Hepatic cirrhosis	2	2	100
Insanity	4	3	75
Syphilis[4]	10	5	50
Morphinism	1	1	100
Hemiplegia	1	...	...
Measles	3	3	100
Pertussis	2	2	100
Typhoid fever	3	3	100

The extremely high mortality, which is shown in the foregoing table in the chronic nephritis cases, is due to the fact that only the severe types of this disease were recorded in the clinical diagnosis as such. As has been previously pointed out, albumin was found in the urine in 78 per cent. of the cases, and casts in 53 per cent.

The *sputum* was examined in 156 cases, with the following results:

	Times.
Pneumococcus present	139
Pneumococcus absent	10
Streptococcus present	4
Staphylococcus present	2
Micrococcus catarhalis present	2
Streptothrix	2

Blood cultures were made in 16 cases; and the following organisms were found:

	Times.
Pneumococcus present	8
Staphylococcus present	2
Negative results	4

Four patients in whom pneumococci were cultured from the blood recovered, 2 died. Of the 4 cases in which blood cultures were sterile 3 died and 1 recovered One pure staphylococcus case recovered. One in which the last-named organism and the pneumococcus were found together died. It will be seen, therefore, that no prognostic conclusions can be drawn from the presence of pneumococci in the blood. The frequency with which they are recovered is largely a question of technique. It is probable that in every case pneumococci gain entrance to the blood stream. Cases have been reported in which this organism has been recovered from the blood when there was no evidence of pneumonia or any other grave systemic disease. The recent experiments of Tizzoni and Panichi[7] have shown that the pneumococcus may remain in the blood of animals for months after inoculation regardless of whether or not an active or passive, a partial or a complete, immunity had been developed previous to the inoculation. They have suggested, therefore, that recurrence of attacks of pneumonia are due to the fact that the organism has never been eliminated from the blood, and that some temporary lowering of resistive power has enabled them to gain a fresh foothold and renewed virulence. These authors also found that in some animals infection was unattended by symptoms of illness, but that if a trauma was inflicted, localized infection occurred at the point of injury, and sometimes ended fatally. In the present series there were 2 cases which followed close upon injury to the chest. One of these cases died, one recovered.

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[4] The frequency of this condition is certainly underestimated. In many histories the condition was unrecorded except when very striking objective appearances were present.

[5] The proportion of intemperate subjects is also underestimated in the histories. Only those cases were collected in our statistics which were put down as habitual drunkards or in words to that effect.

Pneumococcemia, or the presence of this organism in the oral or respiratory passages of apparently healthy people, explains how a temporary reduction of individual resistance may precipitate an attack of pneumonia. It has been shown experimentally, by Lode and Lipari, that the old idea about chilling of the body as a predisposing factor of pneumonia rests on a solid basis. The first-named author found that animals shaved to the extent of one-half or one-third of their integument, if exposed first to heat, then to cold, and finally inoculated with pneumococci, developed pneumonia and pleuritis much more frequently than did the controls, the ratio being as 85 to 12.

Leukocyte counts were made in 189 cases. When more than one count was made the highest was taken for our statistics:

	Cases.	Died.	Mortality. Per. cent.
Below 10,000 leukocytes	27	11	40
Between 10,000 and 20,000 leukocytes	81	25	32
Between 20,000 and 30,000 leukocytes	55	14	25
Between 30,000 and 40,000 leukocytes	17	6	35
Between 40,000 and 50,000 leukocytes	6	3	50
Between 50,000 and 60,000 leukocytes	2	0	0

These figures illustrate what is, I believe, generally accepted regarding the prognostic significance of leukocytes, namely, a count ranging between 10,000 and 30,000 is most favorable. Higher figures often indicate suppurative complications and are, therefore, to be regarded with suspicion; whereas, leukopenia bespeaks lack of reaction and is, therefore, to be unfavorably interpreted. The highest count met with in the present series was 57,000 and occurred in a case complicated by phlebitis, which subsequently developed an abscess of the lung, but eventually recovered. Of late a renewed interest has attached itself to the question of leukocytes in relation to the opsonic index. The subject has been studied by MacDonald[8] Wolf,[9] Potter, and Krumwiede,[10] and quite uniform results have been reported. During the early stages of pneumonia there is a subnormal opsonic index, which in favorable cases increases gradually, and at the time of the crisis rises considerably above the normal. Wolf found that as the opsonic index increased the actual number of leukocytes diminished, making it appear that in the early stages the increased number of white corpuscles counteracted the deficiency of the opsonic power, a fact which has apparently been substantiated by Rosenow's[11] investigations. The opsonic index was examined in only one case of the present series, in which it was reported as being 2.15 on the day of the crisis. Rosenow found that an inverse relation existed between the number of leukocytes and the number of pneumococci in the blood.

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[7] Centralbl. f. Bakt., 1905, xxxvi, 25.

Among the somewhat unusual and interesting results tabulated, the following may be mentioned:

Three patients passed intestinal parasites while in the active stage of pneumonia; 2 of these died. Attention has long been called to the fact that such an event occurs.

Nine of the patients were in their second attack; of these 6 died, a somewhat unusual occurrence, since second attacks are often milder than primary ones; 4 of the patients were attacked for the third time; 3 of these recovered. I have no doubt that these figures underestimate the frequency of repeated attacks. The question is often not put by the resident physician who takes the history, and in very many of the cases, owing to the patient's inability to speak English, or to the fact that they were admitted in a delirious condition no history was obtainable.

Delayed resolution occurred 6 times. All of these patients eventually recovering at least to the extent of being able to leave the hospital. Relapses occurred in 4 cases; 2 of these died.

So-called ether or operative pneumonia occurred in 3 instances, 1 of these terminating in death. The etiology of this condition is somewhat obscure. There are a number of predisposing factors which come into play: (1) It has been shown by Snel that ether reduces the bactericidal power of the lungs; (2) chilling of the body which occurs as the result of a loss of heat from the skin and the respiratory passages may play a part; (3) some cases are purely coincident and would have been disclosed if the lungs had been carefully examined before the operation; (4) pneumonia occurs after operations in which no ether is used, even when done under local anesthesia, especially after abdominal sections, and apparently result from emboli; (5) we have to consider the possibility of the aspiration of infectious material into the alveoli of the lungs.

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[8] Trans. Path. Soc., London, 1906, lvii, 45.

[9] Jour. Infect. Dis., 1906, iii, 731.

[10] Ibid., November, 1907.

[11] Jour. Amer. Med. Assoc., 1905, 871.

Operative pneumonia has been reported with the following frequency:

	Operation.	Pneumonia.	Mortality.
Anders	57,842	46	
Hewitt	2910	3	
Rumboll	1500	6	
Gurlt	52,177	30	
Derjuskinsky	4946	43	0.4%
Kuemmell	1017	40	28
Henle	1787	143	65
Bibergeil	3909	135	
Schultze	5724	27	
Kelly	1800	8	
Rothrock	489	5	3
Silk	5000	13	
Gebele	1196	77	53
Total	140,397	570	(0.4%) (Mortality 45%)

Anyone, I think, who has the courage to try the fresh-air treatment, and sufficient persuasive power over the patient's relatives to allow it to be tried, will, I am convinced, never abandon it, even though the future may bring us a specific for pneumonia in the form of a curative serum. Of course, it takes time to eradicate prejudices and to change beliefs. It has not been so very long since patients with tuberculosis were advised to spend their time in closed rooms before a stove. It is an even shorter time since pneumonia patients were swathed in poultices, enveloped in jackets, and kept in rooms in which even the windows and doors were made as air-exclusive as possible by stuffing cotton into the cracks. We have gradually dispelled the fear of cold sponging and bathing in typhoid fever, and we will in time abate the dread of fresh air in pneumonia.

I shall never forget a big negro, in the third day of his pneumonia, whom I saw in the general medical ward, restless, fevered, and panting, the typical picture of the anguish which one so often sees in these cases. An hour later I saw him in the pneumonia ward whither he had been promptly transferred. It was a cold day in March, the windows and the door were wide open, so that there was a constant current of fresh cold air blowing over the beds. The patient greeted me with a smile, displaying a fine line of teeth which contrasted strikingly with his Ethiopian blackness, and remarked, "Fo de Lawd, Doc, I feels lak anoder man down hyar." This is not an isolated or exceptional incident, numbers of patients desperately ill have told me, upon inquiry, that they felt "pretty good." If then we can show not only an increased *bien faisançe* on the part of the patient, but also a reduced mortality, and an absence of deleterious effects why should not this method of treatment be the usual instead of the exceptional one?

THE PHARMACOLOGY OF HEART STIMULANTS.[1]

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A subject so broad as that covered by the title of this paper cannot be considered within a reasonable limit of time, and I shall therefore confine my remarks to those drugs which are classed together as the digitalis group, and to those pharmacological points which are of interest especially to the medical therapeutist. In discussing this subject I shall consider first one or two noteworthy facts common to the whole group, and, then, the points of individual difference of its more important members.

There are three essential factors in the action of these drugs which interest clinicians: (1) The stimulant influence upon the cardio-inhibitory mechanism which prolongs the diastole and thus slows the pulse; (2) the increase in the tonicity of the heart muscle leading to a more complete and more powerful systole; and (3) the constriction of the bloodvessels. The dicrotism, the incomplete diastole, and the incoördination of the heart, which are produced by very large doses of digitalis, are toxic manifestations and of minor importance to the therapeutist.

The action of digitalis in slowing the pulse is, I believe, a much more important factor in its beneficial influence in heart disease than is generally deemed. It is evident that if the quantity of blood thrown out by the heart at each contraction were constant, then the more slowly the heart beat the less blood would be pumped in a given time; in other words, if the volume of the pulse remained the same the rate of the pulse would be an accurate criterion of the work performed, and an inhibitory stimulation would mean less work done by the heart and consequent reduction in the blood pressure. But the volume of blood expelled at each contraction does not remain the same. The longer the diastole, within reasonable limits, the larger is the volume of the pulse wave. It has been shown experimentally by Elving and Wendt[2] and others that there is a degree of compensatory correlation between the rate and the volume of the pulse so that the amount of blood pumped by the heart per minute tends to remain constant despite variations in its rate.

The mechanism of this arrangement is not difficult to apprehend if we remember that the slowing of the pulse depends chiefly upon the prolongation of diastole. The lengthening of the period of auricular relaxation allows more blood to flow from the great veins

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[1] Read at the meeting of the American Therapeutic Society, Philadelphia, May 7, 1908.

[2] Skand. Arch. f. Physiol., 1907, xix, p. 96.